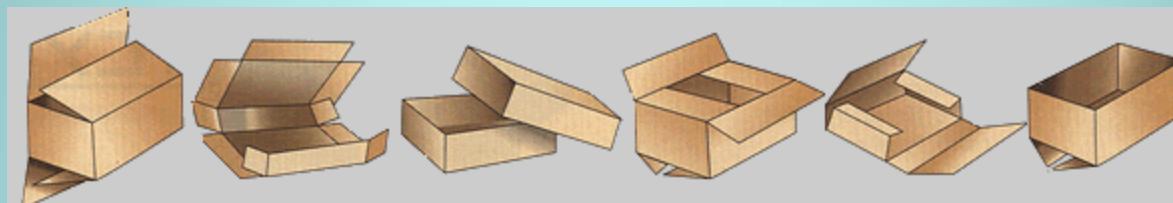
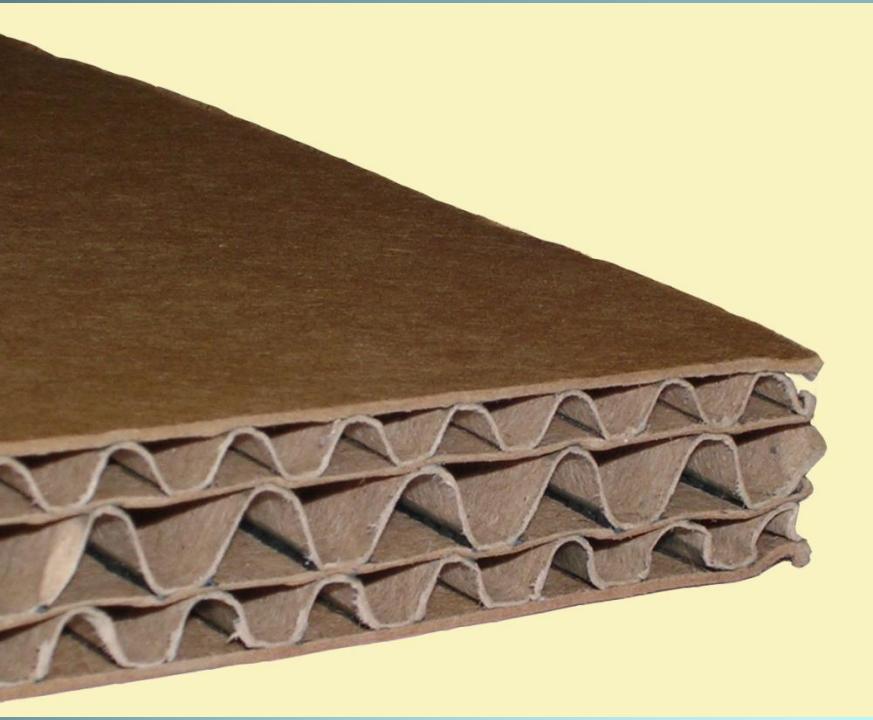


# CORRUGATED 101



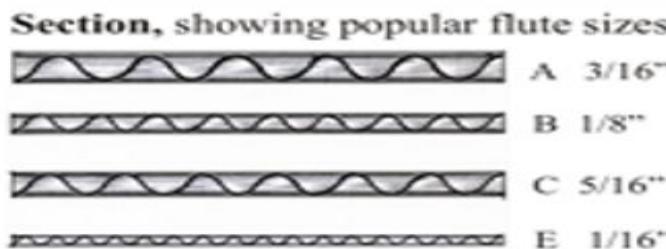
# What makes the corrugated Corrugated



Corrugated boxes are designed to be very strong. They are made of ***corrugated paperboard***. Look at the edge of corrugated paperboard, and you will see a row of air columns. The air acts as a cushion, while the paper columns make the material strong

Hint wavey flutes in the middle

## COMMON CONFIGURATIONS



*Good when scoring & bending*



Single Wall



Double Wall

*Preferred profile for covering flats*



Double Wall

Corrugated comes with three basic finishes, **KRAFT & WHITE**

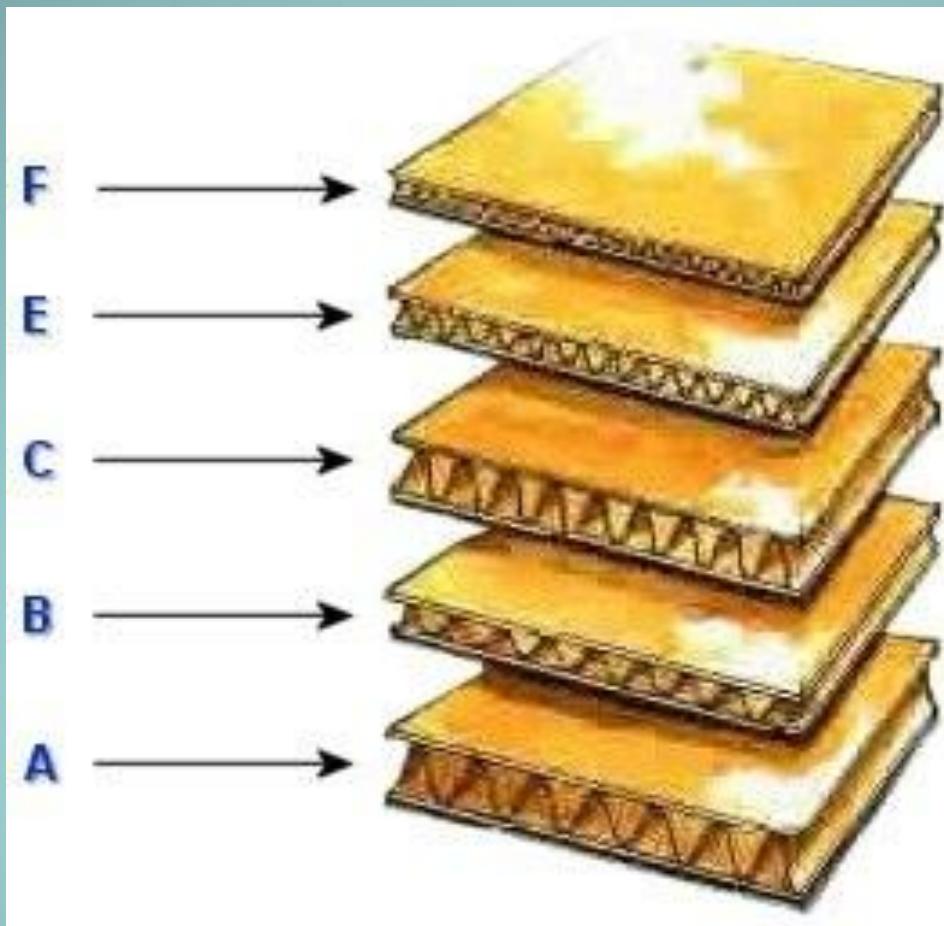


Triple Wall

Single wall- corrugating medium glued between two flat liners

Double wall corrugated board- adding another corrugating medium and a third flat liner

# DIFFERENT TYPES OF FLUTES



# Tale of the flutes

- "B-Flute"(used for die-cut boxes) and is compressed and appears thinner, but don't be fooled. It is made with more paper to provide stronger side wall protection from blows and punctures.
- “C-flute” is taller with more air space, but offers enhanced stacking strength. - C-Flute (used for RSCs).
- “ E-flute” is used for excellent graphic reproduction

## Board Tests: Mullen and Ect

### Linerboard Performance Standards

Max Wt. Box/Contents (lbs.)	Min. Burst Test Single/Double Wall (lbs. per sq. in.)*	Min. Edge Crush Test (ECT) (lbs. per in. width)
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#### Single Wall Corrugated Boxes

20	125	23
35	150	26
50	175	29
65	200	32
80	250	40
95	275	44
120	350	55

#### Double Wall Corrugated Boxes

80	200	42
100	275	48
120	350	51
140	400	61
160	500	71
180	600	82

# Mullen Test

- Tests the bursting strength of corrugated board – how much pressure is required to rupture the wall of a piece of corrugated material
- Made up of virgin fiber and recycled fiber
- Stronger box and better printable surface
- The higher the number, the stronger the corrugated box.
- More expensive than ect
- Most common grades 200# and 275#
- 200# - 275# - 350# - 500#

# Edge Crush Test (ECT)

- which was developed in the 1990's, measures the stacking strength of corrugated board – how much top to bottom pressure a box can withstand before crushing
- Made up of 100% recycled fiber
- 32ECT boxes have become extremely popular since the Edge Crush Test was introduced, partly due to cost, and partly because stacking strength is a more meaningful measure of how a box will perform in the field.
- Most common 32 ect and 44 ect
- 48 ect double wall -51 ect doublewall

# Single Wall

## Mullen Combination

125	26/23/26
150	33/23/33
171	35/23/35
175	35/23/35
200	42/23/42
243	56/23/56
250	56/23/56
252	69/23/42
275	69/23/69
350	90/23/90

## Double Wall

## Mullen Combination

200	35/23/26/23/35
275	42/23/42/23/42
350	56/23/42/23/42
400	69/23/42/23/69
450	69/23/69/23/69
500	69/23/69/23/69
600	90/26/90/26/90

## Mullen Test & ECT Liner Combinations

### Flute Caliper

ECT	Combination
32 ECT	35/23/35
40 ECT	56/23/56
44 ECT	56/23/56

### Flute Caliper

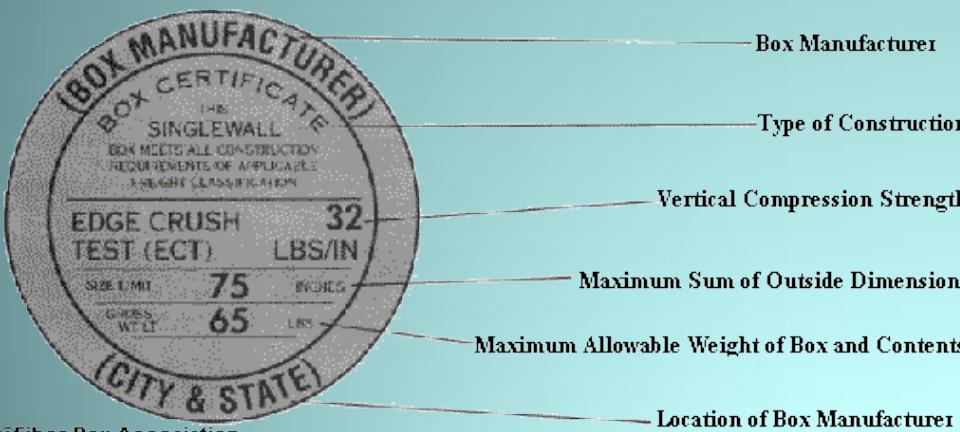
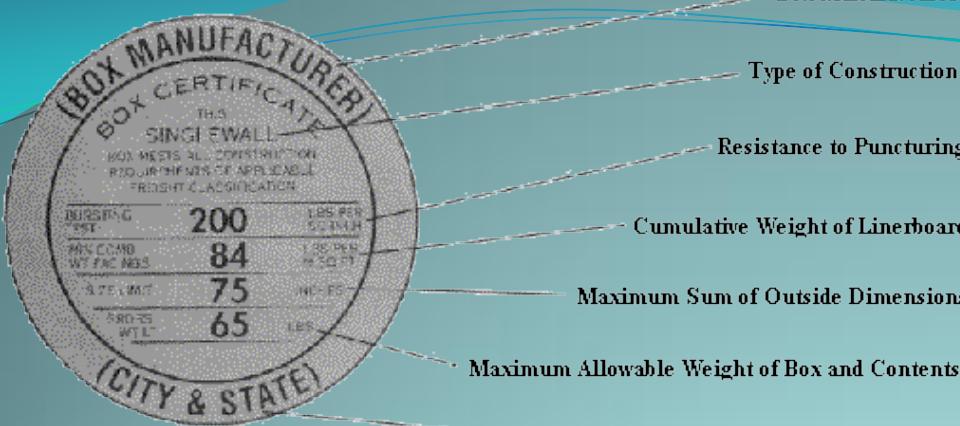
ECT	Combination
42 ECT	33/23/33/23/33
48 ECT	35/23/35/23/35
51 ECT	35/23/35/23/35
61 ECT	42/23/33/23/33
71 ECT	56/23/35/23/35



**Choose A Box  
Style That Best  
Fits Your Application!**



Figure 4: Examples of Box Manufacturer's Certificates

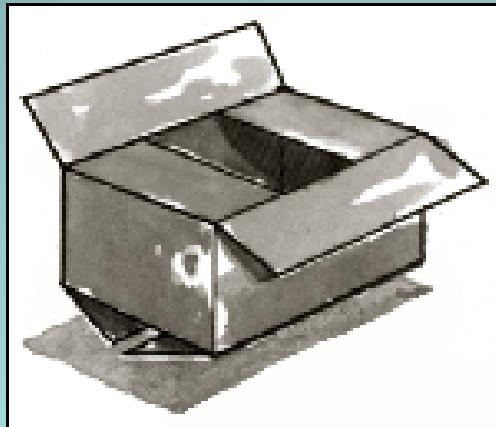


the material of the box that you're purchasing meets industry standards is to look for the Manufacturer's Certification Stamp

42# per square inch basis weight paper and the medium or flute paper cannot be less than 23# per square

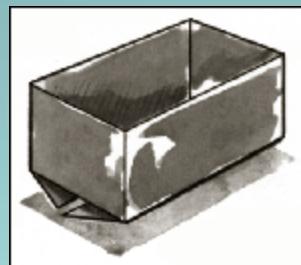
# Box Makers' Certificate

## **REGULAR SLOTTED CARTON (RSC)**



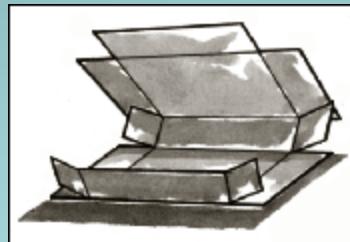
**Also called shipping boxes, RSCs are the most commonly used boxes. They are usually kraft brown in color, have four flaps on the top and bottom and the side walls are sealed at one corner known as the "Manufacturer's Joint." This design is highly functional for most packing applications.**

## **HALF SLOTTED CARTON (HSC)**



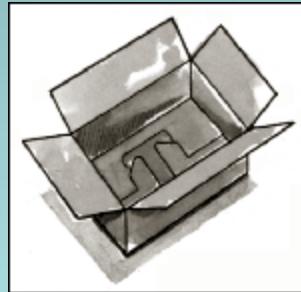
**A variation of the RSC, the Half Slotted Carton has only one set of flaps. The opposite side of the box is completely open, allowing it to slide over an item. Envision the use of the box turned over so that the flaps are on the top. The covered item is usually attached to a pallet or other type of surface that serves as a separate bottom.**

## **Five-Panel Folder (FPF)**



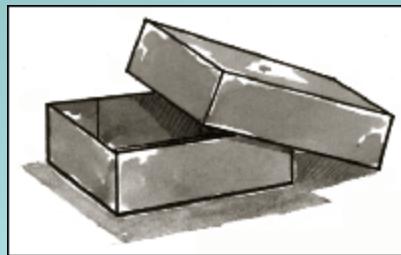
**A Five-Panel Folder actually resembles a shallow-depth box when assembled. It is a one-piece box with an over-lapping top and over-lapping end panels. The functional design is also economical.**

## **Snap-lock Bottom Carton (SLBC)**



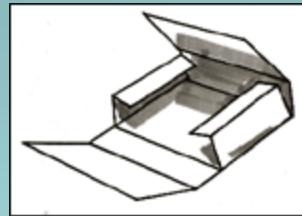
**Available with tuck-in top or with RSC-style top flaps (shown). Also referred to as an "auto bottom" box. The bottom of the box snaps into place without tape for quick assembly. Best suited for light-weight products.**

## **Full Telescope Design Carton (FTD)**



**A two-piece box with a separate lid that fits over a bottom tray.**

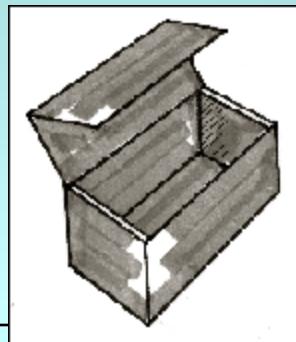
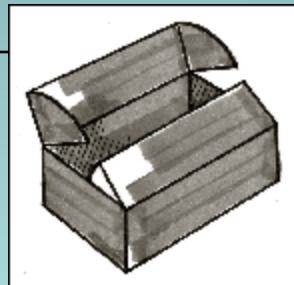
## **One-Piece Folder (OPF)**



**The One Piece Folder has a flat bottom with two short flaps forming the sides at each end and two longer, wider flaps that form the front, back and top of the box. The wider flaps either meet or overlap on the top, depending on the depth of the contents. The four panels of a Bookfold are usually scored (creased) at multiple depths. One-Piece Folders are used to package shallow depth items such as books and pictures. Usually manufactured with white board.**

## Tuck- Top

A one-piece die-cut box that is assembled without tape. Construction includes double-layer protection on the sides and bottom of the box. Available in two popular styles - with a tuck-in top or with a locking cover, also known as a "cherry lock" design. (See illustrations) Mailer-Style Boxes are exceptionally strong and can withstand the most rigorous treatment during shipment.



# How does a board become a box?

**Converting machines** “convert” flat corrugated boards into boxes. The most common kinds of converting machines are flexo-folder gluers and die cutters.

## **Flexo-folder gluers**

print, crease, slot, trim, fold and glue the box so that it can be shipped flat and then be easily formed by the customer and packed. (rsc and hsc)

**Die-cut machines** cut the corrugated board into a pattern the customer will fold and glue into the box shape.

A **rotary die cutter** uses cutting edges called **dies**, and **creasing rules**, on a big roller to cut and score the corrugated board as it moves beneath it. (large quantities and large die cuts parts eisels and backings)

A **flat die cutter** presses knives and creasing rules against a stationary board, the same way you press a cookie cutter into cookie dough. (roll end tuck tops and Litho displays)

**Litho-laminator** is used to paste the color-printing surface paper together with the corrugated sheet.

A photograph of a tropical sunset. In the foreground, several palm trees stand silhouetted against the sky. In front of them are white beach umbrellas and some purple flowers. The ocean stretches across the middle ground, meeting a horizon where the sun is setting, casting a warm orange glow. The sky is filled with wispy clouds.

**THE END**

**THANK YOU**